THE AMERICAN ARCHITECT

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OFFICE BUILDING, MALLEABLE IRON RANGE CO., BEAVER DAM, WIS.
MESSRS. LOCKWOOD, GREENE & CO., *ARCHITECTS AND ENGINEERS*

SOME ESSENTIALS IN THE CONSTRUCTION OF AN INDUSTRIAL BUILDING

By W. FRED DOLKE, JR.
Lockwood, Greene & Company, Boston, Mass.

AN industrial building, in its essential characteristics, is a structure designed and erected to house an industry. As such it supports and protects the machinery, both inanimate and human, which constitutes the productive factor, and the goods which are the product of the manufacturing process.

Consequently, no matter what other factors may enter into the design of an industrial building, the primary essential, the most important consideration of all, is utility. Under the stress of modern business competition and conditions economical operation of the factory is the determining feature on the profit and loss page of the ledger.

It is no exaggeration to say that the majority of the industrial concerns of this country are laboring under excessive operation charges because of adverse manufacturing conditions, brought about either through the initial selection of unsuitable types of buildings, or through arrangements of departments which are entirely illogical, arrangements necessitated by the building itself. Therefore, the most important essential in the design of a new factory building is that the structure shall so serve the needs of the particular industrial enterprise that, so far as the influence of the building itself is concerned, the operation charges will be reduced to a minimum.

Because of conditions which will arise from limitations of the property, such as existing buildings or the shape or size of the lot, it is not possible to completely

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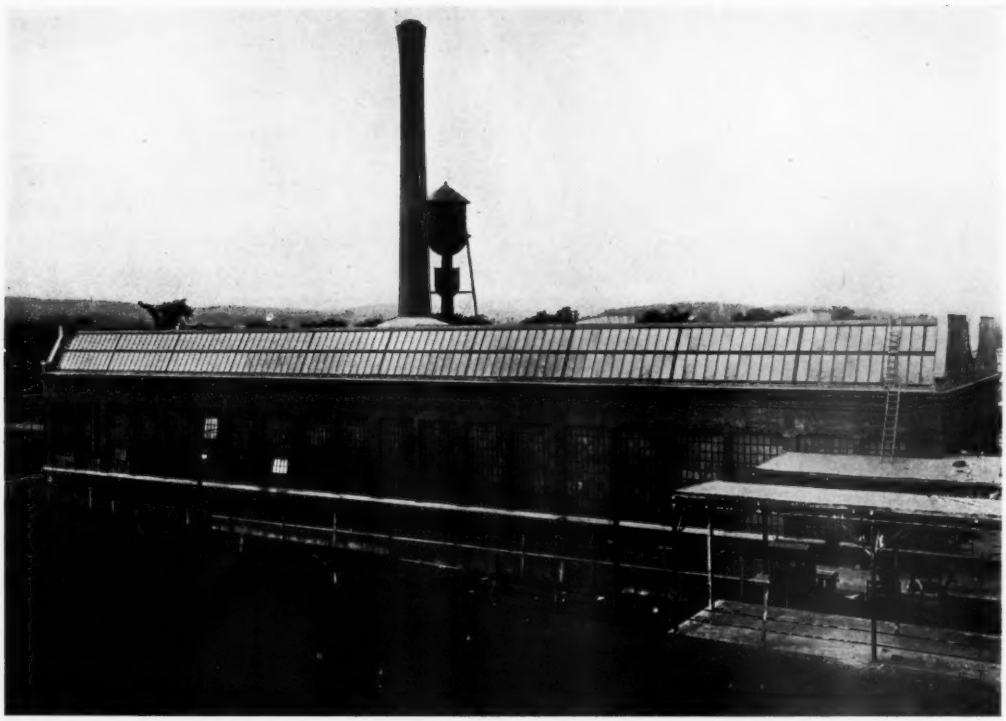
achieve this ideal, except in those rare cases where a new plant is to be erected on a large unencumbered plot of land. In either case, however, it is necessary to economical design that the designer shall have a clear working knowledge of all the machinery to be installed, of the processes to be carried on, and of the plan which will be followed in the finished plant for the administration of the manufacturing work.

The most important preliminary drawings are the machinery plans and the sketches which show the progress of materials through the various parts of the factory. These must be studied and pondered over until that arrangement of department and machines has been reached which under all the conditions will be productive of the most economical operation. The architect, on the basis of these drawings, must construct in his imagination a phantom picture of the finished machinery layout with all the departments in their proper places, and then in his vision will gradually unfold under and around and over this picture the image of a building which in all its fundamental characteristics will be exactly suited to the enterprise in hand.

It is evident of course that the amount of this kind of study necessary will vary from almost nothing in the case of a small addition to an existing plant to a maximum of effort when an entirely new and large plant is to be designed. The principle, however, will always remain that the primary essential of an industrial building is utility.

With the fundamental characteristics determined, the architect will find that the solution of other essential requirements will follow easily. In fact many essentials will almost automatically determine themselves. Certain predetermined preferences of the owner will point the way in some instances; questions of cost or expediency will determine others.



ENAMELING BUILDING, ACME WIRE CO., NEW HAVEN, CONN.
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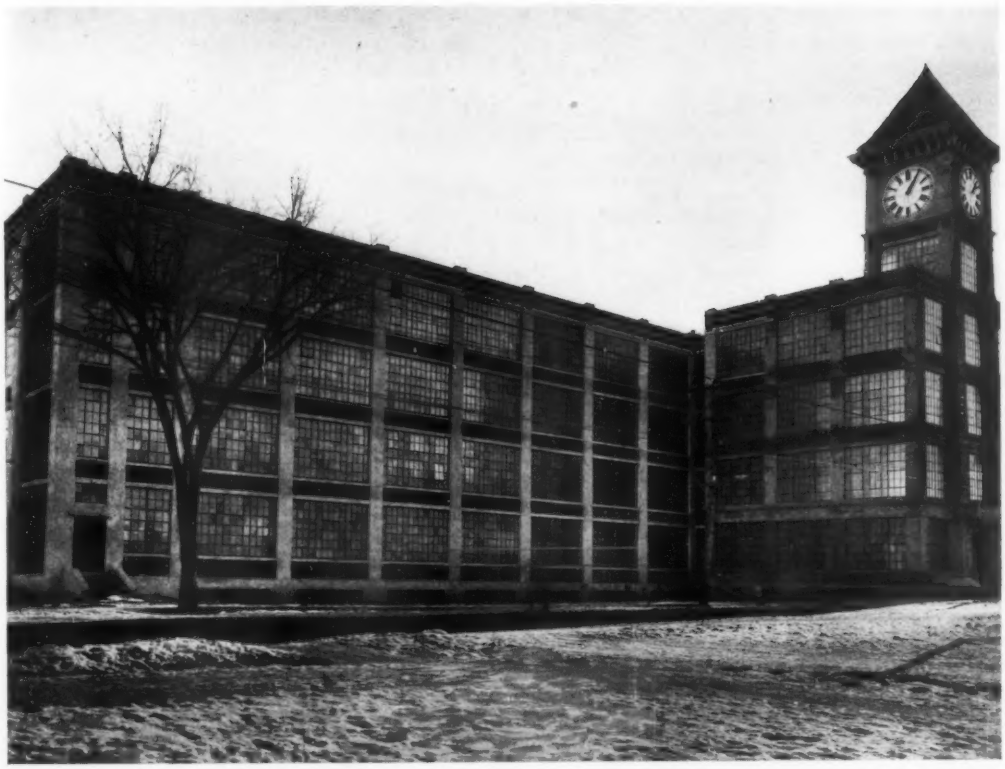

FACTORY, SETH THOMAS CLOCK CO., THOMASTON, CONN.
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The type of building will have been settled by the limitations of the property and by the machinery layout. The type of construction to be used will depend on many conditions which must be carefully examined for each job. Only in isolated and exceptional cases should ordinary wood construction be used, and even then the architect, for the sake of his own and the profession's reputations, if for no other reason, must emphatically register his disapproval of the erection of "fire-food."

Anyone who has followed the changes in modern industrial methods is familiar with the new attitude of the up-to-date factory manager with regard to fireproof construction. No longer is it merely a question of getting the most advantageous insurance rate, it is a question of life itself. The manufacturer now says, "A disastrous fire in my plant would practically put me out of business. Fire insurance would never repay me for loss of business, loss of prestige, least of all for the certain loss of my force of skilled operators. The struggle to rebuild and re-equip a new plant, to train a new force of employees, to get back lost business in the face of to-day's strenuous competition, would require an outlay of capital and effort which would be beyond my resources."

Consequently it is essential that a plant shall be at least highly fire-resisting. Standard mill construction with first-class automatic sprinkler equipment will be satisfactory for many industries, while others, in which the fire hazard is greater, will certainly require fireproof construction.

Abundance of daylight is now an accepted essential in factories. In fact, any added expense which may be necessary within reasonable limits to secure a full measure of natural light will be justified. Well lighted workrooms unquestionably make for good health, relieve eye strain,

tone up a working corps, insure a better product with less waste, and reduce the hazard of accidents.

Many industries require the concentration of heavy machinery in a small space, a condition which subjects the floors and walls to a continuous daily vibration. In some cases high-speed machines which have reciprocating parts cause constant tremors to pass through the construction. However, in many of the older textile mills extraordinary conditions of vibration have existed for years without apparent serious results. It would seem, nevertheless, that in cases of heavy and constantly repeated shocks there may be danger of failure of local parts through fatigue of materials.

The most serious effect of vibration is that which it has on economical operation. Wherever vibration exists in such strength that it is noticeable, employees will instinctively be apprehensive of the failure of the building, they will suffer loss of efficiency due to fatigue, and in the long run their nervous systems will be seriously impaired.

There are instances, however, in which too great rigidity would be most undesirable for certain classes of machinery. For example, in weaving heavy fabrics, the breakage of loom parts has been excessive when looms are mounted on concrete floors with no provision for absorbing the shocks produced.

The problem of vibration, while not new, has yet to receive either full recognition or sufficient serious attention. Particularly is this statement true of the high loft buildings which are becoming common in our larger cities. The resulting economic losses are unquestionably large, if analyzed from all standpoints, and the elimination of vibration is consequently an important factor in the efficiency of any plant.

The health and comfort of employees is another serious factor in economical

BUILDING OF DIAMOND MATCH CO., OSHKOSH, WIS.
MESSRS. LOCKWOOD, GREENE & CO., *ARCHITECTS AND ENGINEERS*

ENGINE ERECTING SHOP, SHEFFIELD CAR CO., THREE RIVERS, MICH.
MESSRS. LOCKWOOD, GREENE & CO., *ARCHITECTS AND ENGINEERS*

operation, and good air, sanitary provisions well placed, and good plumbing are therefore essentials in the design of an industrial building.

Plenty of good, clean atmosphere full of oxygen is necessary to full efficiency of any worker. In certain industries, such as the rubber works and match factories, where the processes are productive of heavy fumes, it is imperative that fresh air be continuously blown in. In the older Cuban tobacco works, where most primitive conditions prevail, it is necessary to provide readers to keep the workers from falling asleep, while in modern American cigar factories where more ideal conditions of ventilation prevail, the tobacco fumes can hardly be detected.

Anyone of good taste who has occasion to inspect the toilet facilities in some of the older mills and factories cannot keep down a feeling of disgust at the conditions he finds. Certain it is that the self-respecting skilled workman will not maintain his connection with a plant which expects him to work under such filthy conditions. It is true, undoubtedly, that many workers are yet unable to appreciate good, clean sanitary conveniences, but that this state is rapidly passing away is shown by the stringent plumbing laws so many States have enacted.

In an organization of highly skilled workmen, the toilet facilities should be of the best, as these employees are of so much value to a factory that no point should be overlooked which will make their working conditions more attractive to them. In other plants, however, whose employees, from the rough and begriming nature of their work, do not appreciate the finer qualities, the plumbing installation should be designed for simplicity and sturdiness.

Recreation and rest rooms, hospitals, dining rooms, libraries, and company schools are all now rightfully recognized as playing essential parts in the economical operation of a plant. The human machine must not only be surrounded by the right conditions to work at its best, but modern competition has set a pace so rapid and has so intensified and speeded up man's work that the employee needs every

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available agency to improve his conditions and surroundings.

It is for this economic reason, if for no other, that manufacturers have been weaned away from the old idea that a factory building *per se* must be a blot on the landscape. Man's response to his environment is a recognized phenomenon of everyday life. Not only will a workman take pride in his position in a factory civilization and that it is their duty as leaders in the industrial world to build structures which will raise the mental and moral standards of the industrial workers. The employer is without doubt "his brother's keeper" and as such his duty is plain.

The essential and fundamental characteristic of a factory building will always be utility, but side by side with it

ROBERTSON-CATARACT ELECTRIC CO., BUFFALO, N. Y.
MESSRS. WOOD & BRADNEY, *ARCHITECTS*

which is attractive and interesting in its appearance, but he will unconsciously feel its influence to keep him steady and faithful—not alone to his job, but also to his home and to the community.

To an architect it may seem a waste of time to argue that a building should be so designed as to be beautiful in its appearance. But many manufacturers have yet to learn that beauty and attractiveness in buildings are the distinguishing marks in now stands that other requisite, attractiveness. Attractiveness, or beauty, means simply good taste. There are many essentials in the construction of every building, such as windows, piers, copings, which can be so grouped and spaced, so molded, that beauty results with little extra cost. Beauty does not mean lavishment. It means simplicity and good taste in disposition of members, and in use of materials.

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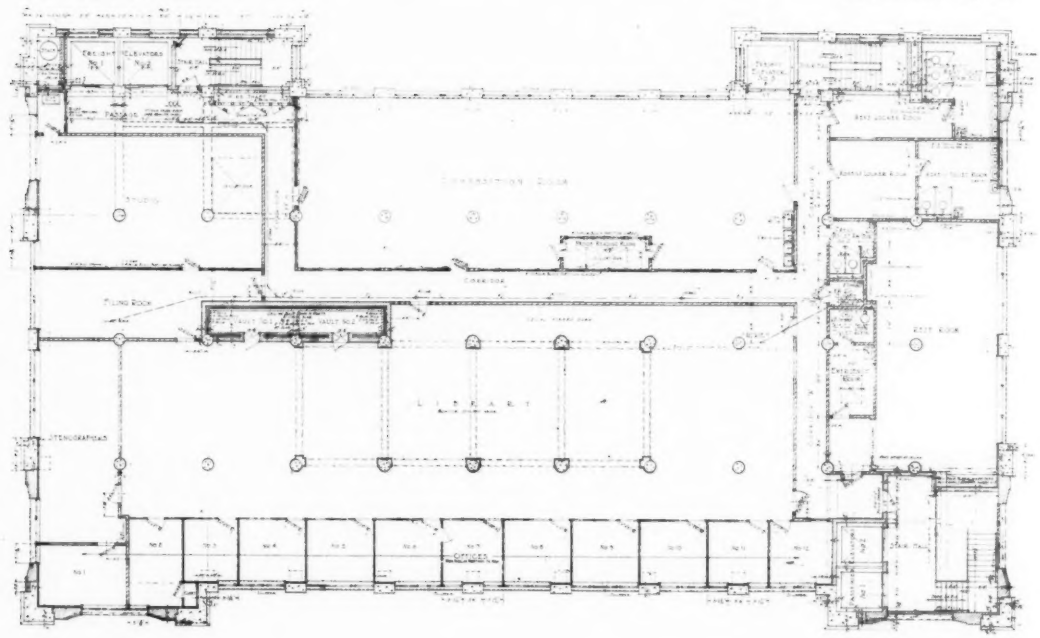

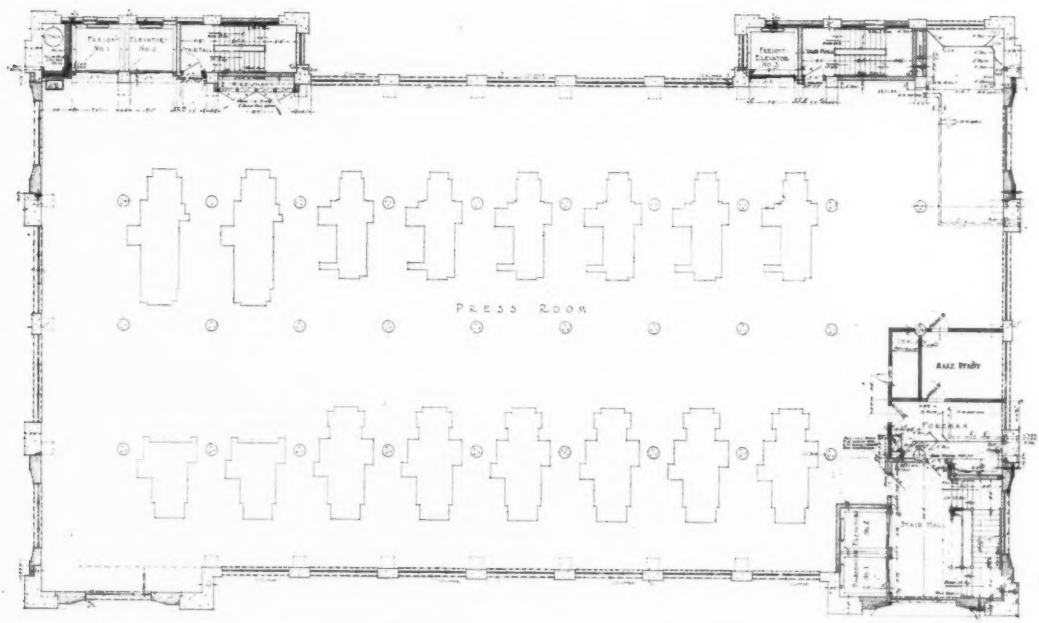

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WAREHOUSE

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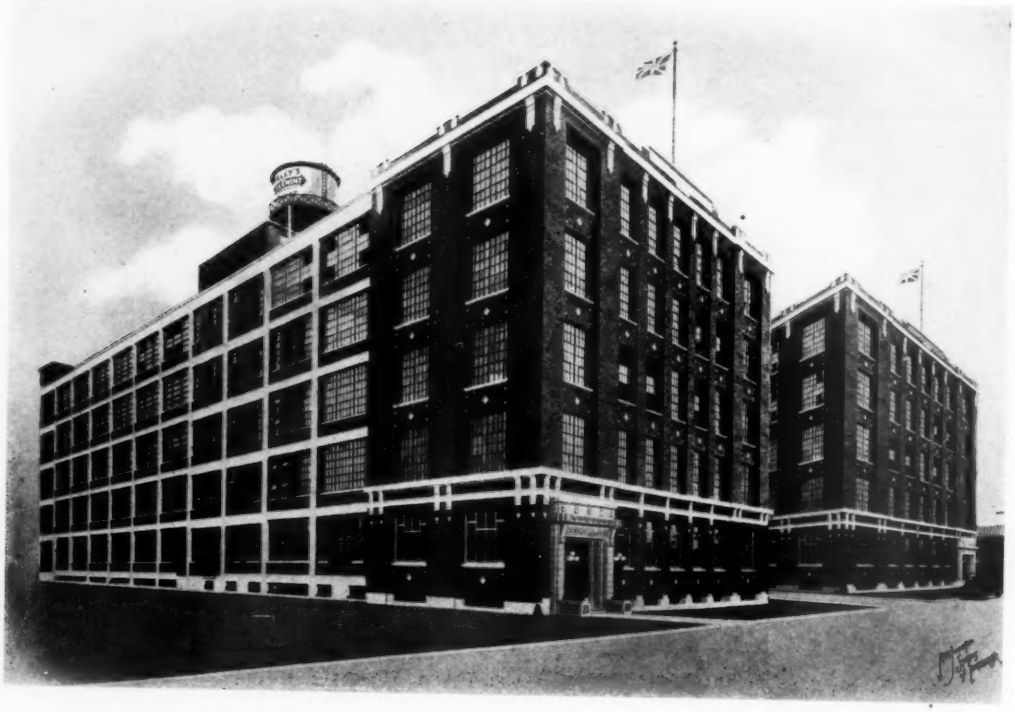

BUILDING OF WILLIAM WRIGLEY, JR., CO., LTD., TORONTO, ONT.

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BUILDING OF DEFIANCE PAPER CO., NIAGARA FALLS, N. Y.

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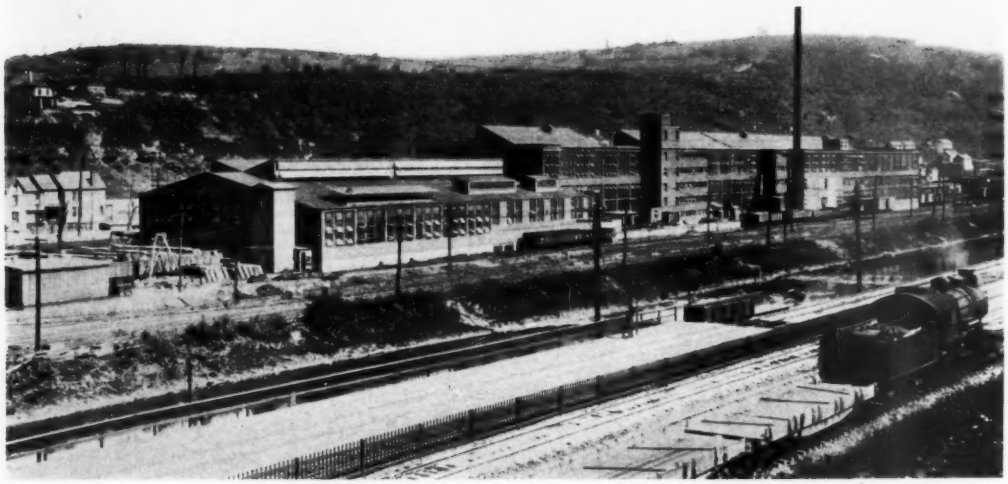

ADDITION TO EAST PITTSBURGH PLANT, WESTINGHOUSE ELECTRIC & MFG. CO.

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MESSRS. DAY & ZIMMERMANN, *ARCHITECTS AND ENGINEERS*

POWER PLANT, CINCINNATI-BICKFORD TOOL CO., CINCINNATI, O.
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OFFICE BUILDING
CINCINNATI-BICKFORD TOOL CO., CINCINNATI, O.
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PLANT OF PHILADELPHIA TEXTILE MACHINERY CO., PHILADELPHIA, PA.

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FEBRUARY 21, 1917
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FACTORY BUILDINGS OF RICHMAN BROS. CO., CLEVELAND, O.

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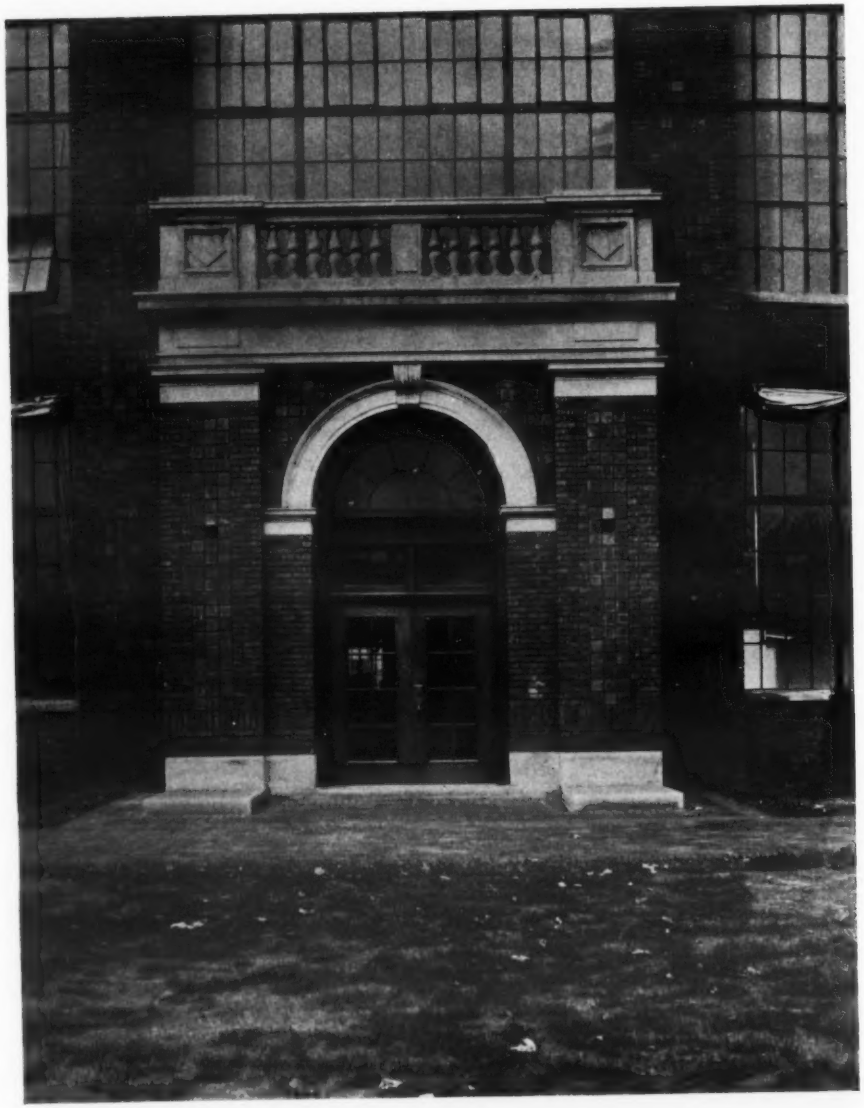

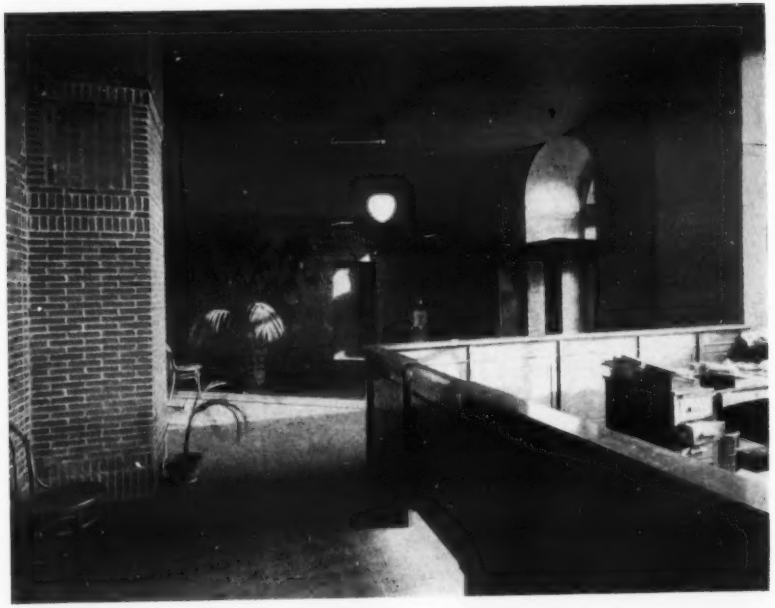

FACTORY BUILDING OF MESSRS. RICHMAN BROS.,
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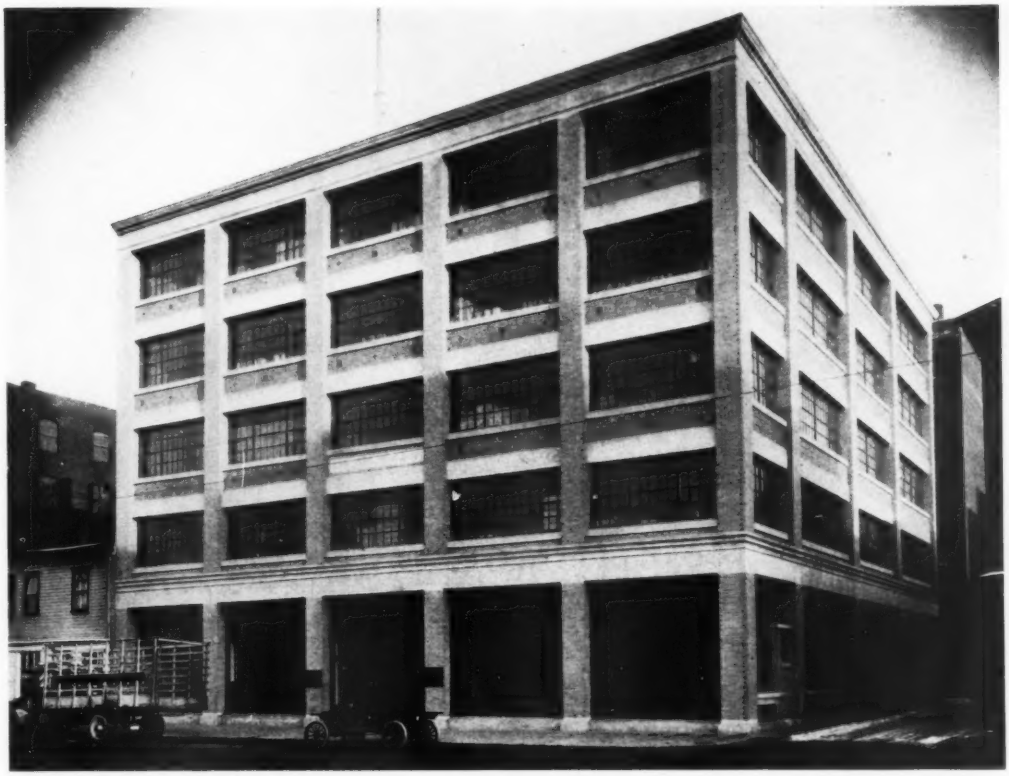
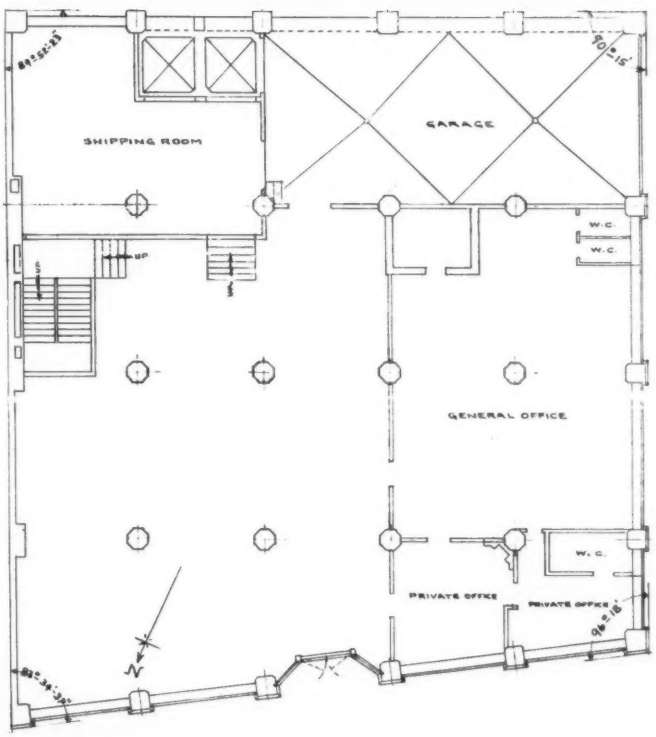
BUILDING OF KAHN TAILORING CO., INDIANAPOLIS, IND.

MESSRS. VONNEGUT & BOHN, *ARCHITECTS*





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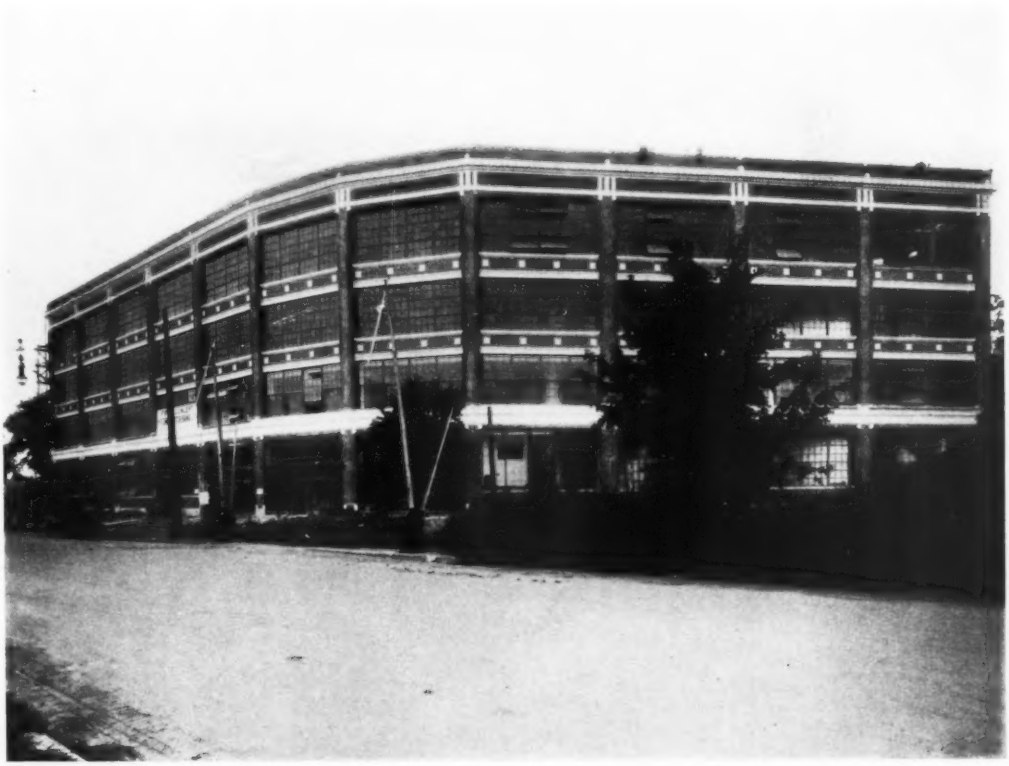

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VIEW ACROSS SUNKEN GARDEN IN FRONT OF ADMINISTRATION BUILDING

MAIN PLANT—SEARS, ROEBUCK & CO., CHICAGO, ILL.

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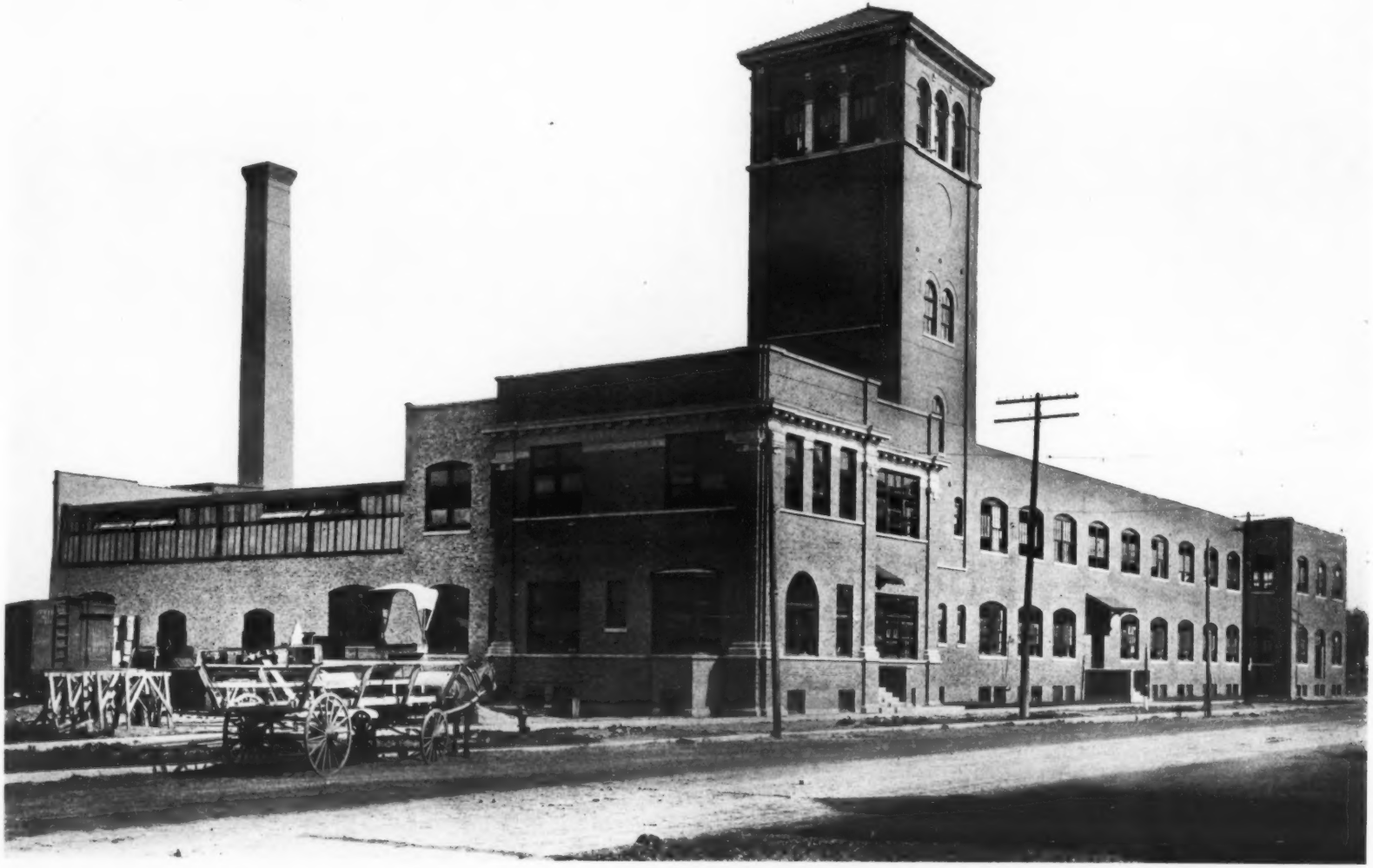

BUILDING OF DUDLEY MFG. CO., CHICAGO, ILL.

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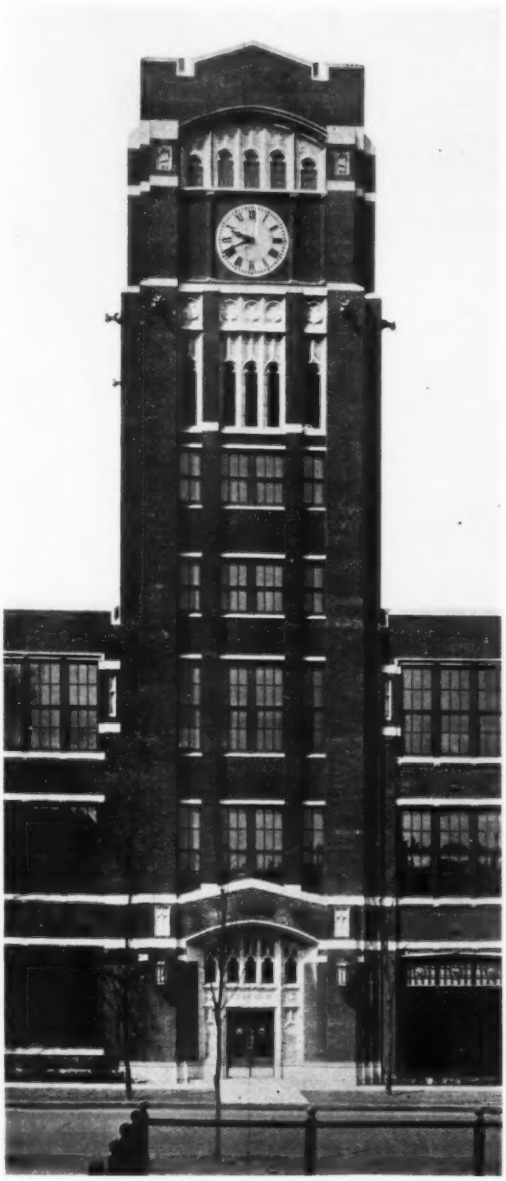
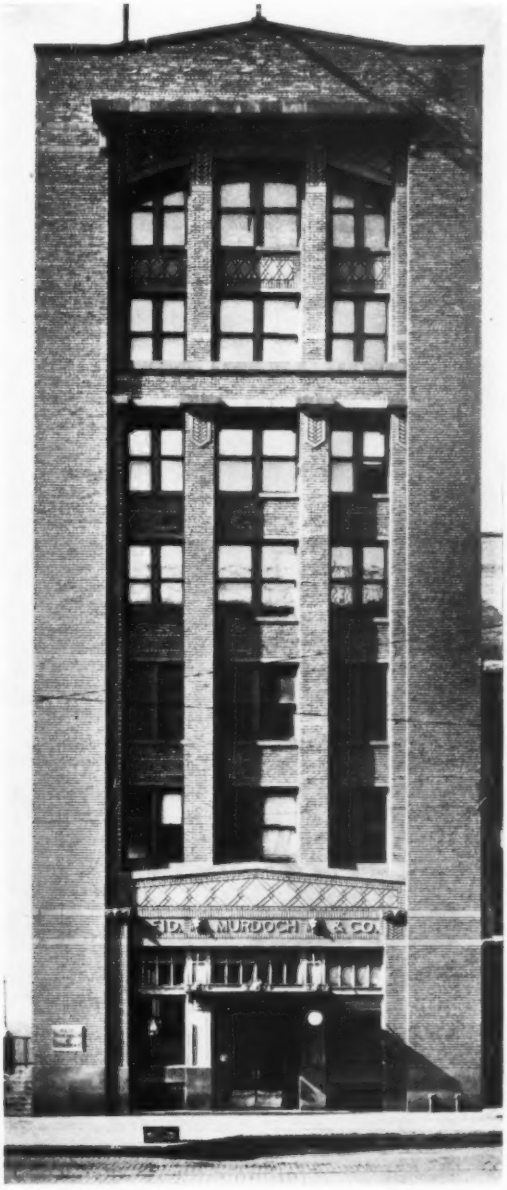


TOWER, C. P. KIMBALL & CO.'S BUILDING, CHICAGO, ILL.



CLARK ST. ENTRANCE TO REID, MURDOCH & CO.'S BUILDING, CHICAGO, ILL.

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FACTORY ENTRANCES

THE ARCHITECTURAL OPPORTUNITIES OFFERED IN THE DESIGN OF ENTRANCES TO FACTORIES AND SIMILAR BUILDINGS

By F. M. GARDINER

THE title "Factory Entrances" has been chosen advisedly in preference to a considered alternative "Industrial Entrances." The latter would cover, perhaps, a broader field, but the major portion of that field is covered by the former, and the types of buildings which would be classed under "Industrial" but not under "Factory" are more apt to have the proper amount of attention given to them as problems in architectural as well as in structural design.

In a previous issue of THE AMERICAN ARCHITECT the writer treated, briefly, the subject of architecture as applied to industrial buildings from an economic standpoint. In selecting a subject for a further article architectural detail in general, as applied to factories, and architecture in factory offices were considered as well as the subject chosen. It was felt, however, that the field covered by factory offices was rather limited, inasmuch as it applied, except for interior design, only to plants which could boast separate office buildings, and that the entrance covered the essential principles of detail, and could be treated in a less involved manner than a discussion of all the separate architectural details contingent to the design of factory buildings.

It is not intended to vaunt the entrance as the one feature to be considered architecturally, far from it. Of first importance, always, is the study of the composition as a whole, but in the matter of detail the entrance stands pre-eminent, and has greater power to add to, or detract from, the attractiveness of the whole than any other single unit.

DETAIL OF ENTRANCE
PROVIDENT LIFE & TRUST CO., PHILADELPHIA
MESSRS. DAY & ZIMMERMANN, *ARCHITECTS AND ENGINEERS*

It would be hard to select better instances of the ability of the entrance to give character to a building than that of some of the smaller churches designed by Cram, Goodhue and Ferguson, in which all of the ornamentation is concentrated about the entrance. Plain, uncompromising stucco walls, with a riot of decoration at the entrance which reacts upon the eye in much the same way as a brilliant spot of vermillion in an otherwise drab-colored painting.

It may seem rather far-fetched to apply ecclesiastical to industrial architecture—and yet the underlying principle

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DETAIL, MAIN ENTRANCE

PHILADELPHIA TEXTILE MACHINERY CO., PHILADELPHIA, PA.

MESSRS. DAY & ZIMMERMANN, *ARCHITECTS AND ENGINEERS*

is precisely the same. There is this difference, however, in its application, that whereas in other types of buildings the "spot of color" if it may be so called is not limited to the design of the entrance, in

ENTRANCE TO OFFICES OF WARNER BROS. CO., BRIDGEPORT, CONN.

MESSRS. DAY & ZIMMERMANN, *ARCHITECTS AND ENGINEERS*

the design of factory buildings it often happens that the entrance is the one spot which can be treated with any great view to architectural expression.

Factories may or may not have cornices, they may or may not have buttresses, they may or may not have towers—affording opportunity for the architect's skill in design—but they *must* have entrances. If circumstances are such that little or no architectural expression can be given to the factory as a whole, the entrance, at least, should be allowed pleasurably to impress the eye and to give to the throngs which pass and repass, the keynote to the standards and practices which are behind it.

The entrance is a detail made up of details, and what it lends to the whole of which it is a detail must be given it largely by the smaller details of which it is itself composed. It should not only be appropriate to the class of industry housed by the buildings, but its details should be so designed and blended as to give, insofar as possible, a suggestion of the characteristics of the business with which they are connected. If the building itself is designed with this in view, and the entrance is designed in harmony, the effect in detail will follow of itself. Interesting results are often obtained, as shown in some of the accompanying illustrations, by the use of trademarks or other significant insignia, properly applied—these in themselves indicate to the casual observer, at least to some extent the nature of the contents of the building or the occupation of the firm which occupies it.

More subtly an entrance may express the attitude of the buildings' owners. Often one sees an entrance that leaves a

(*Continued on page* 123)

ENTRANCE TO KENT BUILDING, BROOKLYN, N. Y.

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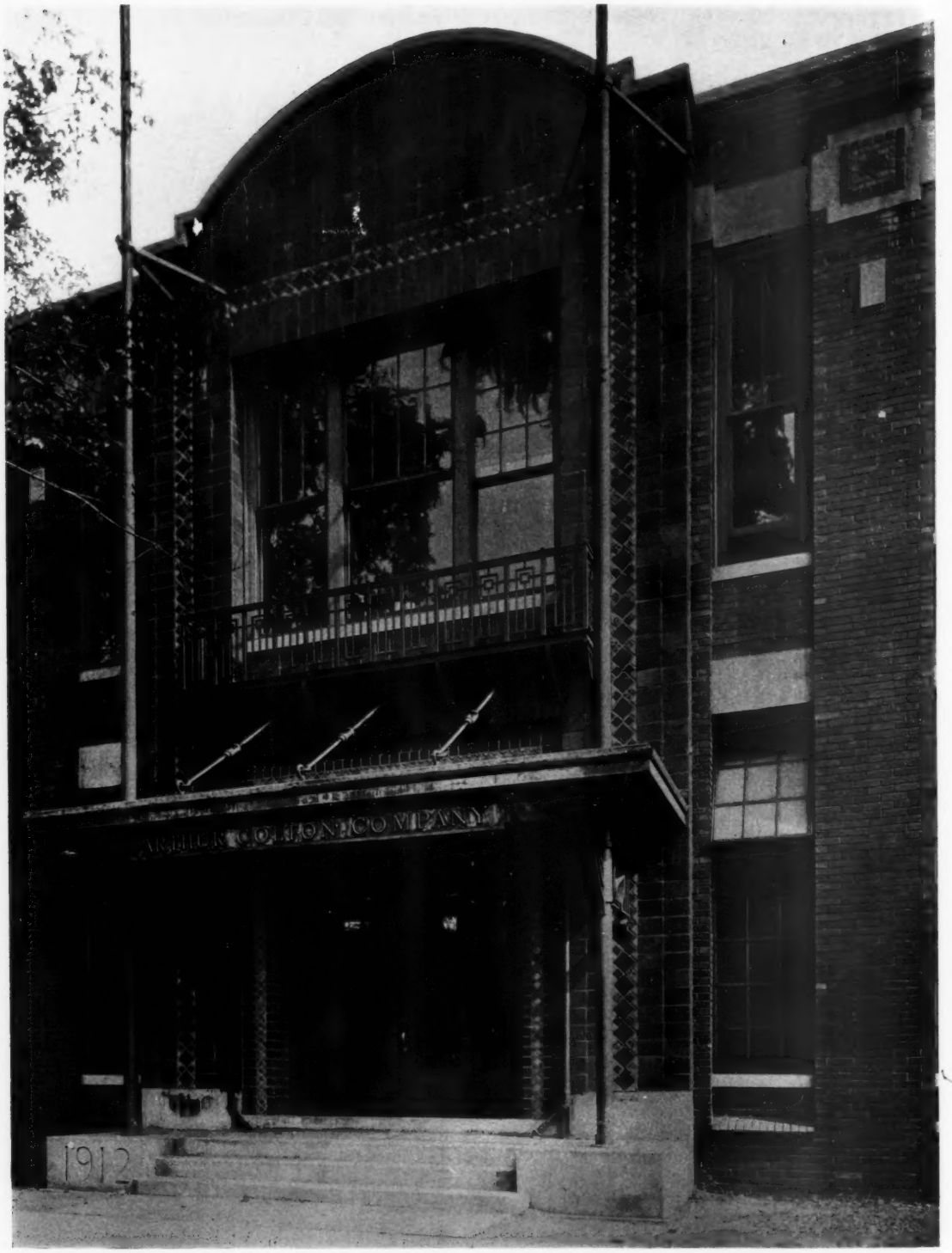

DETAIL OF MAIN ENTRANCE

FACTORY OF ARTHUR COLTON CO., DETROIT, MICH.

MESSRS. MILDNER & EISER, *ARCHITECTS*

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THE PRACTICAL VALUE ATTACHING TO GOOD ARCHITECTURE

IN a letter received from a firm of architects, referring to an important industrial building recently completed, it is stated: "So thoroughly have the features of safety, comfort, convenience, and hygiene been conserved in connection with the design and equipment of this building that the changes in the working personnel have been almost negligible, and there is a large list of applicants eager to fill the first vacancies."

This statement describes a condition in our larger industries that, fortunately, is each year becoming more usual. Promoters of large industrial enterprises are realizing that to insure the best results, the highest efficiency, and consequently the best character of product, it is necessary to take into consideration the attitude of labor toward its employers and the facilities they furnish their employees. It is undoubtedly true that no man can render service up to the limit of his ability where his labor is not performed under the most favorable environment. Conversely, when men find that while they are but a cog in a large and complicated piece of machinery, their employers realize that they are of sufficient importance to the general result to warrant thoughtful consideration for their welfare, both mental and physical, their labor acquires a certain dignity in their minds and they strive to give forth the best that is in them.

It might be difficult to incorporate esthetic features in all modern industrial buildings with the consent of the owners, using humanitarianism as an argument; but since in every instance where there have been expenditures of much time, thought and money to surround the working people with attractive features, it has been found to be a good commercial investment, there should no longer be difficulty experienced in accomplishing this result if the architect has collected proper and sufficient data on the subject. Strikes and the discontent that leads to them, dissatisfaction and indifference, the enemies of efficiency, have all in a large measure been overcome by the builders of the most modern and artistic "plants"; and as these conditions contribute to dividends and also serve to popularize any product made under them, they present an argument that even the most matter-of-fact boards of directors can understand, and the potency of which they will readily admit. In fact, if the pride of employment and the large measure of contentment indicated by the letter from which we have quoted is at all general, architects, in their efforts to improve the architectural character of industrial buildings, will find that they can secure inestimable aid from the laboring classes who work in them.

A COMMON WEAKNESS IN INDUSTRIAL BUILDING DESIGN

THE following comment made by an architect of undoubted ability in design, would seem to be worthy of serious consideration by those whose work falls to some extent at least in the industrial building field:

"In looking through architectural publications presenting industrial plants it seems to me a common weakness in design, particularly where skeleton construction either of reinforced concrete or steel is used, that the corner bays or end

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pavilions are weak in appearance in that the window openings are carried too close to the corner of the building. Where the structure is constructed between two lot lines flanked by adjoining buildings there is, no doubt, good excuse for this, but where the structure stands free and light may be drawn from both directions it is difficult to understand why the designer should not make a stronger pier and thereby bind in his composition, since there is light in abundance and to spare under these circumstances."

Here is a specific criticism the justice of which will probably be acknowledged, applying to industrial buildings generally. Unfortunately, it also applies, although to a lesser degree, to other types of buildings, in which, however, there is greater excuse by reason of the practical requirements, which more often occur and dominate the design. There are, as has been shown, a number of expedients that can be utilized by a resourceful designer to overcome in part the unsatisfactory appearance of a thin and insufficient corner pier, when such a pier is believed to be unavoidable. Before reaching the conclusion that it is unavoidable, however, it is usually well to make careful and detailed analysis of the supposed or assumed practical advantages of the narrow corner pier. In a great number of instances such analysis will result in demonstrating that the advantages are wholly imaginary.

TRADEMARKED MATERIALS

UNDER present conditions with the cost of building materials advanced in most localities from fifteen to thirty-five per cent above prices current in 1915, it seems worth while to study the results obtained from various investigations made for the dual purpose of ascertaining causes of increases and effecting all possible economies. Of particular interest to both architects and owners engaged in such study are the reports of an inquiry recently conducted to determine the relative increases in cost of trademarked materials, compared with those sold without brand or other means of identification. It appears that in almost every instance the manufacturers of widely advertised, branded or trademarked goods were the last to increase the prices of their products. Further than that, with few exceptions the advanced cost of production had been assumed in part by the manufacturers in the case of trademarked goods, whereas in others it was passed along to the consumer entirely, if in fact it was not increased.

The result of the inquiry might have been foretold, as it simply demonstrates again the responsibility which the manufacturer of a trademarked article feels, and which is not shared by the maker of a non-branded material. Not only must a manufacturer of the trademarked goods stand behind them but he must avoid dissatisfaction, even with the price, to the limit of his ability, and a majority of them would rather assume a temporary loss of profits than to disturb relations with their customers by increasing prices. Where, as in the present instance, it is no longer possible to market their goods at the old price, it is found that they have increased their prices as little as is consistent with the maintenance of quality and continuation in business.

Viewed from any angle, it would seem that an architect is always protecting both his client's interests and his own reputation by selecting for use only those goods whose manufacturers are responsible, and who proclaim and make real that responsibility by marking their products so that they can be identified at all times, or at least until they have finally reached their respective places in the work for which they were intended.

FACTORY ENTRANCES

(*Continued from page* 119)

homelike impression, as though anyone were welcome, and as though the relations between employer and employee were on a somewhat more cordial and familiar basis than might be expected in the present day of intense efficiency. On the other hand, perhaps as often, the impression is given of dignity, of quiet moving, majestically turning machinery and soft-treading secretaries. Yet again the aspect may be forbidding, as though "leave hope behind all ye that enter here" were engraved above, though it is gratifying to note that this is more often true of the older type of factory than of the more modern, just as disregard of employee and public was more common a decade ago than it is to-day.

So far the subject has been treated as would apply for the most part to factories where one, or possibly one main entrance and a subsidiary entrance were all that were necessary. While what has been said applies in general to all factory entrances, it must be remembered that in plants of any size, comparatively speaking, there are not one or two, but many entrances, each with a purpose of its own. Insofar as possible the character of all the entrances should conform to one type, but at the same time, each should express its particular use. Width and height will in themselves often effectively suggest the purpose for which the entrance was designed, and thereby simplify the problem. On the other hand, where the only difference in purpose lies in the class of work carried on by those who pass through it, its distinctive purpose must be brought out by expression in its design of the work with which it is connected. The so-called "Double Duty" entrance deserves a word here, as it seems peculiarly to express co-operation between distinct units. This is particularly true where employers' and employees' entrances are so treated, wherein both gain the advantage of retaining their individuality, at the same time giving the impression of close relationship.

The basis of application of the foregoing principles and suggestions is not confined to the design of entrances alone, but includes in its broader sense *all* detail, for it is founded on the fundamental principles of architectural design. From the study of the composition of the design as a whole down to the design of the least important detail, these principles hold true —that the design shall be appropriate to the purpose for which the building is to be erected; that each part of the building shall conform to its surroundings, that the design of the exterior shall express the design of the interior; that the whole, and each part, shall express the use to which it is to be put; that the whole shall be so proportioned, outlined, and assembled as to satisfy the eye. It might well be said, "On these hang all the law and the prophets of architectural design."

In Acknowledgment

Acknowledgment is hereby made and our thanks extended to Aberthaw Construction Co., Boston, Turner Construction Co., New York, and to the many Architects and Engineers who have rendered valuable assistance and co-operation in the preparation of this special issue.

A Correction

In attributing to Mr. William Emerson authorship of the article on "The Open Stair Tenement," in our issue of February 14, it was by error stated that Mr. Emerson was a Fellow of the Institute. The title should have read, Member of A. I. A. The origin of this error was entirely with the editorial department of THE AMERICAN ARCHITECT.

GROCERY BUILDING, SEARS, ROEBUCK & CO., CHICAGO, ILL.
MR. GEORGE C. NIMMONS, *ARCHITECT*

REQUIREMENTS FOR THE HEATING AND VENTILATION OF INDUSTRIAL BUILDINGS*

MEASURES TAKEN IN DIFFERENT STATES TO INSURE SUITABLE WORKING CONDITIONS IN FACTORIES

WHILE the factory inspection laws of all the States provide in a general way for healthful working conditions in factories, workshops and mercantile establishments, there are apparently but thirteen States that have definite regulations on the subject. These are New York, Massachusetts, Ohio, Illinois, Arkansas, Indiana, Iowa, Pennsylvania, Michigan, Minnesota, New Jersey, Wisconsin and California.

NEW YORK

Under the present so-called "Labor Law" in New York State all matters pertaining to the heating and ventilation of industrial buildings are in the hands of an industrial commission under whose direction the State Department of Labor is conducted. According to the law, this commission "shall have the power to make rules and regulations for and fix standards of ventilation, temperature and humidity in factories and may prescribe the special means, if any, required for removing impurities or for reducing excessive heat, and the machinery, apparatus or appliances to be used for any of said purposes, and the construction, equipment, maintenance and operation thereof,

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in order to effectuate the purposes of this section."

The law also provides for a bureau of inspection which includes the bureau of factory inspection.

The general terms of the law covering factory ventilation are as follows:

The person operating every factory shall provide in each workroom thereof, proper and sufficient means of ventilation by natural or mechanical means, or both, as may be necessary, and shall maintain proper and sufficient ventilation and proper degrees of temperature and humidity in every workroom thereof at all times during working hours.

As regards mercantile establishments a special section (Section 168-f) states that "every mercantile establishment shall be provided with proper and sufficient means of ventilation by natural or mechanical means, or both, as may be necessary and there shall be maintained therein proper and sufficient ventilation and proper degrees of temperature and humidity at all times during working hours. The industrial board shall make rules for and fix standards of ventilation, temperature and humidity in mercantile establishments."

RULES MADE BY THE INDUSTRIAL COMMISSION

In accordance with the foregoing sections of the "Labor Law," the Industrial Commission has promulgated a number of rules which have come to be known as the "Industrial Code." They are published, as compiled up to July 1, 1916, by the State Department of Labor, together with the law itself.

Violations of the provisions of the labor law are punished by fines running from $20.00 to $50.00 for the first offense.

SEATTLE PLANT, SEARS, ROEBUCK & CO.
MR. GEORGE C. NIMMONS, *ARCHITECT*

FIRST UNIT, KANSAS CITY PLANT, SEARS, ROEBUCK & CO.
MR. GEORGE C. NIMMONS, *ARCHITECT*

Second and third offenses incur penalties running up to $250.00 and imprisonment for 60 days.

MASSACHUSETTS

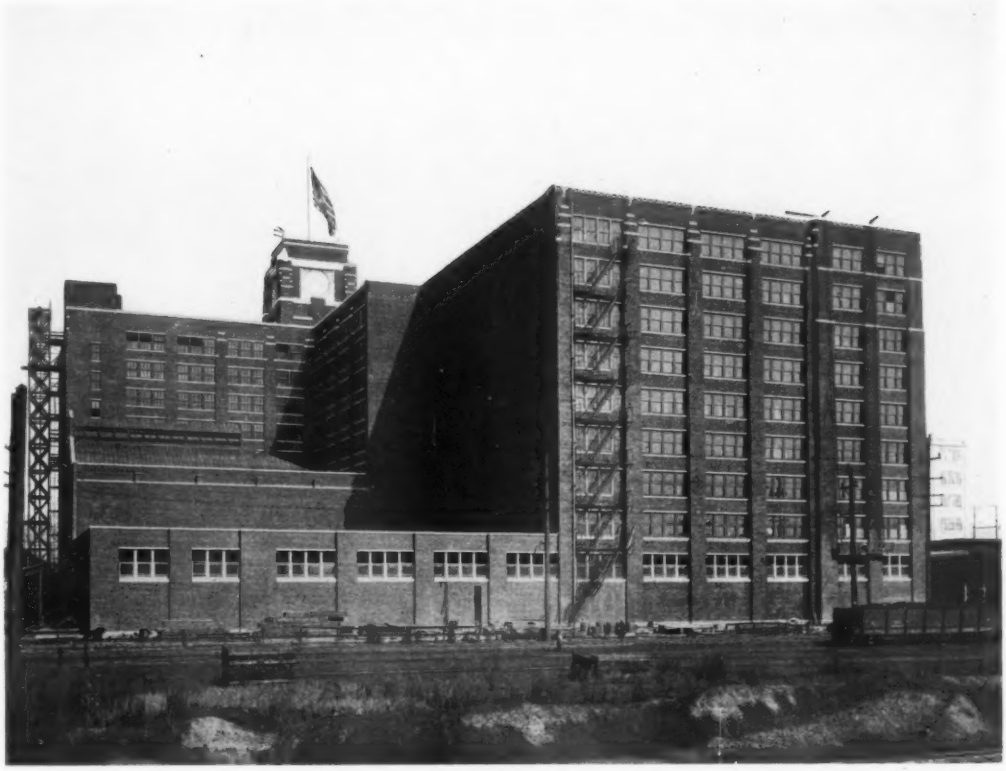
The Massachusetts law is enforced by the Building Inspection Department of the District Police and reads as follows:

"Section 15. No building which is designed to be used, in whole or in part, and no building in which alterations shall be made for the purpose of using, or continuing its use, in whole or in part, as a public building, public or private institution, schoolhouse, church, theater, special hall, public hall, miscellaneous hall, place of assemblage or place of public resort, or as a factory, workshop or mercantile or other establishment and to have accommodations for ten or more employees, and no building more than two stories in height, designed to be used above the second story, in whole or in part * * * shall be erected, and no alteration shall be made therein, until a copy of the plans and specifications thereof has been deposited with the supervisor of plans of the building inspection department of the district police by the person causing its erection or alteration, or by the architect thereof. Such plans and specifications shall include those for heating, ventilating and sanitation, as the supervisor of the plans may require."

A fine of from $500.00 to $1,000.00 is provided for anyone who violates the provision of this requirement.

OHIO

The Ohio law governing factory and building inspection states in Section 989 that each district inspector of workshops and factories assigned to a district for the inspection of shops and factories therein, shall carefully inspect the sanitary conditions, system of sewerage



SEATTLE, WASH., PLANT, SEARS, ROEBUCK & CO.
MR. GEORGE C. NIMMONS, *ARCHITECT*

* * * system of heating, lighting and ventilating rooms where persons are employed at labor," etc.

The term "shops and factories" includes the following: Manufacturing, mechanical, electrical, mercantile, art and laundering establishments, printing, telegraph and telephone offices, railroad depots, hotels, memorial buildings, tenement and department (apartment) houses.

The penalty for failing to comply with the provisions of the code within 30 days varies from $100.00 to $300.00 with each offense.

Additional provisions are included (Section 6330-2) covering especially dangerous works or processes.

In Cleveland, Ohio, a new building code became effective October 14, 1913. It is known as Ordinance No. 29,798. This code has the following relating to "factories and workshops":

"Every building, room or part thereof hereafter erected for, or converted to use as a factory or workshop in which there shall be less than 20 sq. ft. of floor space for each employee or occupant, shall have in operation, while occupied, a mechanical system of ventilation so designed and installed as to provide at least six complete air changes per hour.

"Unless natural ventilation is provided as required by the ordinances of the City of Cleveland, and maintained while occupied, every factory in which there is more than 20 sq. ft. of floor space for each employee or occupant, shall have in operation, while occupied, a system of ventilation so designed and installed as to provide at least four complete air changes per hour."

ILLINOIS

The Illinois law regarding the heating and ventilation of factory buildings is probably the most explicit of any so far

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enacted in this country. It is entitled, "An act to provide for the health, safety and comfort of employees in factories, mercantile establishments, mills and workshops in Illinois and to provide for the enforcement thereof." (Re-enacted and approved June 29, 1915. In force July 1, 1915.)

Section 10 reads: "In every factory, mercantile establishment, mill or workshop, where one or more persons are employed, adequate measures shall be taken for securing and maintaining a reasonable and, as far as possible, equable temperature, consistent with the reasonable requirements of the manufacturing process. No unnecessary humidity which will jeopardize the health of employees shall be permitted."

The meat of the law is in Section 11 which reads: "In every room or apartment of any factory, mercantile establishment, mill or workshop, where one or more persons are employed, at least 500 cu. ft. of air space shall be provided for each and every person employed therein, and fresh air, to the amount specified in this act, shall be supplied in such a manner as not to create injurious drafts, nor cause the temperature of any such room or apartment to fall materially below the average temperature maintained: Provided, where lights are used which do not consume oxygen, 250 cu. ft. of air space shall be deemed sufficient. All rooms or apartments of any factory, mercantile establishment, mill or workshop, having at least 2,000 cu. ft. of air space for each and every person employed in each room or apartment, and having outside windows and doors, shall not be required to have artificial means of ventilation; but all such rooms or apartments shall be properly aired before beginning work for the day and during the meal hours. All such rooms, or apartments, having less than 2,000 cu. ft. of air space, but more than 500 cu. ft. of air space, for each and every person employed therein, and which have outside windows, and doors whose area is at least one-eighth of the floor area, shall be provided with artificial means of ventilation, which shall be in operation when the outside temperature requires the windows to be kept closed, and which shall supply during each working hour at least 1,500 cu. ft. of fresh air for each and every person employed therein. All such rooms or apartments, having less than 500 cu. ft. of air space for each and every person employed therein, all rooms or apartments having no outside windows or doors, and all rooms or apartments having less than 2,000 cu. ft. of air space for each and every person employed therein, and in which the outside window and door area is less than one-eighth of the floor area, shall be provided with artificial means of ventilation, which will supply during each working hour throughout the year, at least, 1,800 cu. ft. of fresh air for each and every person employed therein: Provided, that the provisions of the preceding portions of this section shall not apply to storage rooms or vaults: And, provided, further, that the preceding portions of this section shall not apply to those rooms or apartments in which manufacturing processes are carried on which from their peculiar nature would be materially interfered with by the provisions of this section. No part of the fresh air supply required by this section shall be taken from any cellar or basement.

"The following terms of this section shall be interpreted to mean: the air space available for each person is the total interior volume of a room, expressed in cubic feet, without any deductions for machinery contained therein, divided by the average number of persons employed therein.

"Outside windows and doors are those connecting directly with the outside air; the window and door area is the total area of the windows and doors of all outside openings; and the floor area is the total floor area of each room."

Section 20 covers the ventilation of toilet rooms to the effect that, "where practicable, they shall have direct ventilation with the outside air; where it is impracticable (to so locate them), they shall be placed in an enclosure * * * and separately ventilated.

Fines for failure to comply with the foregoing provisions run from $10 to $50

BUILDING OF SCHLIEDER MFG. CO., DETROIT, MICH.
MESSRS. PRESTON, BROWN & WALKER, *ARCHITECTS*

for the first offense, and from $25 to $200 for the second or subsequent offense.

All buildings and rooms occupied by butterine and ice cream manufacturers must be provided with air shafts, windows and ventilating pipes sufficient to insure ventilation. The factory inspector directs such installations.

ARKANSAS

Factory ventilation requirements in Arkansas are contained in the Workmen's Compensation Law.

INDIANA

The Indiana law on ventilation of industrial buildings states that "there shall be sufficient means of ventilation provided in each workroom of every manufacturing or mercantile establishment, laundry, renovating works, bakery, or printing office within the state, and the chief inspector shall notify the owner in writing to provide or cause to be provided ample and proper means of ventilation for such workroom."

Owners or agents are to be prosecuted for non-compliance with the law within twenty days. The law also provides for exhaust fans for carrying off dust from emery wheels, grindstones and dust creating machinery, the size of mains, etc., being specified.

PENNSYLVANIA

The Pennsylvania requirements regarding blowers and exhausters for use with grinding and polishing machinery are enforced by the Industrial Board of the state. This board publishes a set of directions covering suction test and piping, and other features.

MINNESOTA

The Minnesota law after specifying that each employee must have not less

than 400 cu. ft. of air space unless reduced by a special order of the Commissioner of Labor, goes on to provide for "sufficient means of ventilation" where excessive heat is created, or if steam, gases, vapors, dust or other impurities that might be injurious to the health, are generated.

New Jersey

The New Jersey law provides for exhaust systems in workshops where emery wheels or emery belts of any description are used. Regarding sizes of rooms, it is specified that not less than 250 cu. ft. of air space shall be provided for each employee, between 6 a. m. and 6 p. m., and not less than 400 cu. ft. of air space between 6 p. m. and 6 a. m.

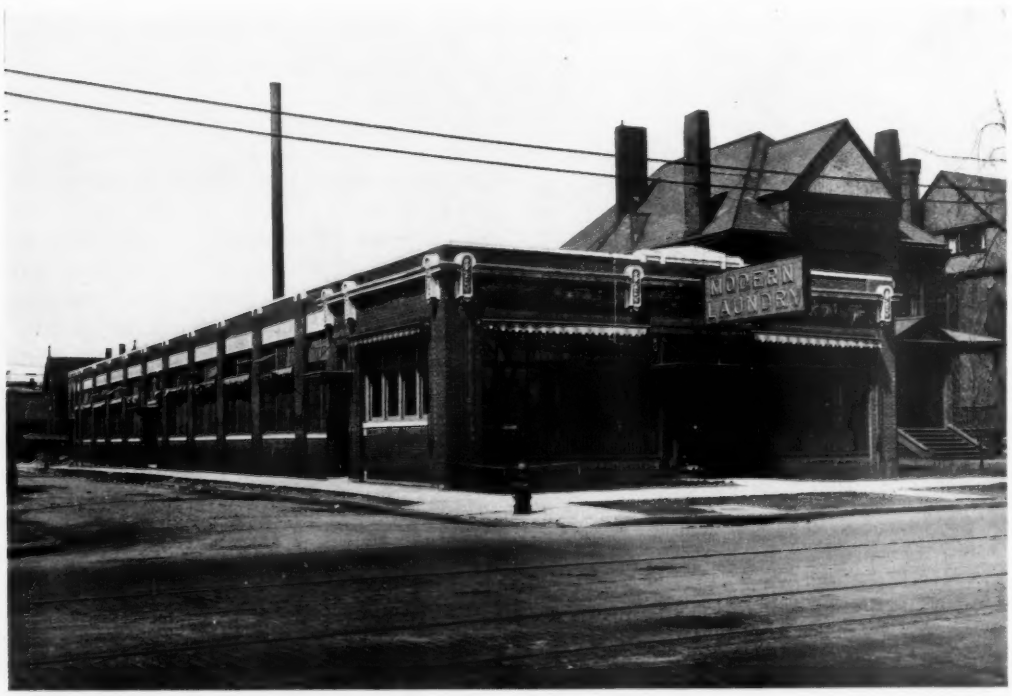
Compliance with the law must be made within twenty days on penalty of $10 fine for each day beyond that limit. The requirements for mercantile establishments state that "the owner, agent or lessee of a place coming under the provisions of this act, or employer, shall provide in each mercantile establishment proper and sufficient means of ventilation; in case of failure, the commissioner shall order such ventilation to be provided."

A similar penalty clause is added as for workrooms.

Wisconsin

The requirements in Wisconsin are in the form of general orders of the State Industrial Commission.

"In Wisconsin the Industrial Commission has power to issue orders for any changes in existing and new systems. The factory head may make an appeal from the agent's ruling and if the majority of the commission decides against him, he must make the required changes. This decision can only be reached after the majority of the commission have visited his factory personally and examined the existing conditions."



LAUNDRY BUILDING, DETROIT, MICH.
MESSRS. MILDNER & EISEN, *ARCHITECTS*

New York State Board for the Registration of Architects

IN spite of the fact that the Board is reported to have met almost weekly for months past, it is stated that there have been a considerable number of complaints made from those whose applications have not been passed upon, although they have been on file for a year. The explanation is to be found in the fact that there have been received a total of two thousand applications, and the difficulty of going over them carefully is greater than was anticipated by the Board, or probably any one else. In fact, the labor involved has necessitated serious sacrifices of their own interests by members of the Board. The first three or four hundred applications were passed upon promptly and at little expense of time and effort in investigation. This was a result of the plan followed. In accordance with it there were selected from among the applications the names of those who were well known to the Board, and about whose qualifications there could be no question. After these had been disposed of the work began to be greater, and the difficulties have steadily increased. Up to the present time, of the two thousand applicants, eleven hundred have been notified that they will be licensed; about three hundred have been notified that they will not receive licenses; investigations concerning the remaining six hundred have not been concluded.

In their painstaking efforts to do exact justice under the law, the Board has even gone so far as to invite some fifteen or twenty applicants to appear personally before it and submit to oral examination in order to better determine the qualifications of the various candidates. There have been from twelve hundred to fifteen hundred sets of plans and specifications submitted in support of applications for licenses, and all of these have or will be examined by the Board. No diplomas will be issued until decisions have been made concerning all applications.

The Board for Registration—a title which is in a sense a misnomer, as it is really a Board for Examination, the registering being done by the Board of Regents of the State university—is a body acting under authority of a State law, and its hearings and records are open to the public. The Board desires, in fact, to be treated as a public body. There is no official business transacted behind closed doors.

Governmental Endowment of a Chair of Architecture

An endowment of £2,000 a year has been granted by the New South Wales Government for a Chair of Architecture at Sydney University; and it is claimed that this is the first occasion of a Government of the British Empire recognizing the national importance of architecture. A certain twinge of envy must therefore accompany our nevertheless sincere congratulations to the Government and to the architects of New South Wales. But the example is not merely for Governments, but for those universities upon whom it has not yet dawned that architecture, broadly considered, has in it all the essentials of a liberal education. This news from New South Wales brings us much nearer to the time when any university from which a well-endowed Chair of Architecture is excluded will be regarded as being hopelessly behind the times. Particulars of the Sydney Chair are not yet available, and it will be interesting to learn whether the conditions provide for the complete absorption of the professor in scholastic work, or whether the authorities adopt the more modern view that he shall be at liberty to keep in touch with actual practice.—*Architect and Contract Reporter.*

Personal

Mr. Maurice H. Finkel, architect, Detroit, Mich., has removed his offices to 309-311 Sun Building, that city, and would be glad to receive manufacturers' samples and catalogs.

Messrs. Walter Grant Thomas and Roscoe Plimpton DeWitt announce the opening of offices for the practice of architecture at 73 Tremont Street, Boston, Mass.

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PLATE AND ANGLE SHOP, FORE RIVER SHIPBUILDING CO., QUINCY, MASS.
MESSRS. MONKS & JOHNSON, *ARCHITECTS AND ENGINEERS*

DESCRIPTION OF CERTAIN BUILDINGS ILLUSTRATED IN THIS ISSUE

Gardner Building, Providence, R. I.

MESSRS. F. P. SHELDON & SON, *Architects*

The general dimensions of the building are approximately 82 ft. by 82 ft. There are five stories and a basement. The foundation and superstructure are so designed that the building can be carried two stories higher whenever desired. When this extension is made, the present cornice will serve for a belt course. Having this in mind, the cornice was designed for the belt course of the future building, seven stories high, and, consequently, it is not as prominent as when the structure has assumed its intended proportions.

The ground floor is used for various offices and display room, shipping room and garage. The basement and stories above the first are used exclusively for the storage of paper.

The framework and floors are of reinforced concrete, beam and girder construction, designed to carry a live load on each floor of 250 lbs. per square foot. The exterior walls are covered with a brick veneer on the columns and panels under the windows, leaving the lower belt course, window lintels and sills, and cornice of exposed concrete.

Building of Defiance Paper Co., Niagara Falls, N. Y.

MESSRS. PRACK & PERRINE, *Architects*

The building of the new wall paper factory of the Defiance Paper Company at Niagara Falls, N. Y., is one of the largest wall paper factories in the United States. It is a flat slab building, and necessarily long to accommodate the printing machines. An elaborate heating system is provided with fans located on the roof and ducts distributing the hot air evenly over the paper for drying purposes. A number of special conveyors, elevators and spiral chutes are also installed, and the construction was easily adapted to such installations. The ornamentations in this case are of artificial stone and tile with a selected face brick, and it is expected that the extra cost of this finish will be amply repaid by its value as an advertising medium.

Canadian Factory of Wm. Wrigley, Jr., Co., Toronto, Ontario, Canada

MESSRS. PRACK & PERRINE, *Architects*

This structure is of the latest type of reinforced concrete flat slab construction. The buildings are kept immaculate and sanitary inside and out.

A part of these buildings are leased to allied businesses and they are in great demand.

The toilet arrangements in this building are quite elaborate; bubbling fountains, shower baths, tiled floors, etc., are much in evidence, with rest rooms for the employees well furnished, victrolas, reading rooms, etc. A shortage of help in either the office or shop is unknown at this

DODGE BROS. SERVICE STATION, NEWTON, MASS.
MESSRS. MONKS & JOHNSON, *ARCHITECTS AND ENGINEERS*

POPE BAKING CO.'S BUILDING, DETROIT, MICH.
MESSRS. MILDNER & EISEN, *ARCHITECTS*

plant, as the surroundings here are so pleasant for the employees that they cannot be induced to leave.

Robertson Cataract Electric Co., Buffalo, N. Y.

MESSRS. WOOD & BRADNEY, *Architects*

Office and warehouse 106 ft. by 80 ft., four stories and basement; floor loads 150 lbs.; steel sash windows; spread footings on piles; flat slab type of construction; sprinkler system.

Addition to East Pittsburgh Plant, Westinghouse Electric & Mfg. Co.

MESSRS. PRACK & PERRINE, *Architects*

The construction is steel and brick, with concrete roofs and heavy laminated wood floors and with concrete cornices and sills. All stories are equipped with cranes of 40-ft. span and heavy capacity. The buildings are located on a narrow strip of land and as originally planned were of uniform construction and appearance. A quick change in manufacturing operations necessitated building a forge shop and furnace building at one end to take care of war orders and this made the carrying out of the original treatment impracticable.

Shoe Factory, Wm. H. Walker & Co., Buffalo, N. Y.

MESSRS. LOCKWOOD, GREENE & CO., *Architects*

Seventy-eight by eighty feet, eleven stories and basement; floor loads 150 lbs.; floors are hard pine and maple on sleepers; steel sash windows; spread footings; beam and girder type of construction; sprinkler system.

Richman Bros. Building, Cleveland, O.

MESSRS. CHRISTIAN, SCHWARZENBERG & GAEDE
Architects and Engineers

This building is a reinforced concrete building of flat slab construction, and occupies a block. It is an E-shaped building, the main section being at the rear of the lot and extending from street to street. This section is 65 ft. by 322 ft. The two outer wings are 65 ft. by 130 ft. and the center wing 65 ft. by 46 ft. The depth of the building along the side streets is 195 ft. and the total frontage 322 ft.

The total floor space is 165,000 sq. ft. The floor finish is cement throughout, except in the lobbies, where red brick tile was used, and in the hospital, which has a gray ceramic tile floor. The hospital has a white glazed tile wainscot 7 ft. high.

The building is concrete frame with flat slab floors and brick curtain walls. The street and court walls are faced with brown Shervan brick, the pilasters being paneled with fire-flashed brick tile for the full height. The parapet has panels of hand-made mat tile.

The main entrance is in the center wing, the main lobby being used as an employment office. Just to the right of the lobby is the hospital and the girls' rest room. The upper floors of the center wing are used for toilet and locker rooms. This wing also contains the main stairway and the elevator. The main stair is a double width, double scissors stair, which will allow eight people to descend at the same time. There are four other stairways located in the outside corners of the building. Stairs are so laid out that nowhere is there a greater run than 100 ft. to a stairway.

The first floor of the south wing is used entirely for dining room service. This room is also used for dances and entertainments by the employees. The remainder of the first floor is used for shipping and finished stock storage.

Offices are located on the second floor. The third and flourth floors are the main operating floors.

The lobby walls are faced with 1½-in. fire-flashed brick with tile panels.

All sash in the building except those for show windows in front is of steel.

The building is heated and ventilated with an air blast system, an air washer being installed to insure pure air.

Warehouse, Manufacturers Outlet Co., Providence, R. I.

MESSRS. MONKS & JOHNSON,
Architects and Engineers

The Manufacturing Outlet Company is a large department store. This reinforced concrete warehouse is arranged as a garage on the first floor with shipping room, the basement is arranged as a sorting room for bundles and the upper floors are used for furniture storage. This building is of flat slab construction and is veneered on the outside with a light gray faced brick with terra cotta cornices and marble tile and terra cotta inserts.

Plate and Angle Shop, Fore River Shipbuilding Co., Quincy, Mass.

MESSRS. MONKS & JOHNSON,
Architects and Engineers

This building is 800 ft. long and 200 ft. wide in two spans of 100 ft. each. It is of steel and brick structure and is arranged on the second floor with a mold loft 600 ft. long and 100 ft. wide and a sheet metal shop 200 ft. long and 100 ft. wide. It is also arranged with offices, toilets, wash rooms, etc., built in the depth of the trusses between the first and second floor. This building is equipped with overhead cranes and also side wall cranes.

Kelly-Springfield Service Station, Newton, Mass.

MESSRS. MONKS & JOHNSON,
Architects and Engineers

Photograph No. 2 is a reinforced concrete structure, veneered with red tapestry brick with terra cotta inserts in the

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frieze. This building was designed especially as a salesroom and warehouse for the Kelly-Springfield Company. It is fitted with an elevator, tire chutes, etc., and is heated by steam. The building is also equipped with sprinklers. It is in Boston and is located on Beacon Street. We have also sent you a photograph of the salesroom interior, which is finished with plastered walls and ceiling; all woodwork is of oak and the floor is all marble mosaic.

Oliver Chilled Plow Works, St. Louis, Mo.

MESSRS. PRACK & PERRINE, *Architects*

A reinforced concrete warehouse and one of a series of similar buildings used by this company in different cities throughout the country, which serve as district sales headquarters and as distributing depots for plows, cultivators and repair parts, built to serve quickly and obviate delays in receiving goods from the factory. The building is of reinforced concrete faced with brick of a reddish buff color and trimmed with light cream colored terra cotta. Loads up to 300 lbs. per square foot are carried.

Garage, Jordan, Marsh & Co., Boston, Mass.

MESSRS. MONKS & JOHNSON,
Architects and Engineers

Façade of waterstruck brick, with limestone trimmings; floors and walls of reinforced concrete. This building is unique in that second and third floors are hung from the roof girders, leaving the first floor absolutely free of all columns. Sprinkler system, steam heated.

BUILDING OF ARTHUR COLTON CO., DETROIT, MICH.
MESSRS. MILDNER & EISEN, *ARCHITECTS*

The Youth's Companion Building, Commonwealth Ave., Boston, Mass.

MESSRS. DENSMORE & LECLEAR,
Architects and Engineers

This is a reinforced concrete structure of the S-M-I flat slab system.

The exterior is constructed with reinforced concrete columns and concrete spandrel beams, the curtain walls being of waterstruck brick.

The building is designed to give the maximum amount of unbroken floor area, the fire exit stairs and freight elevators being in towers on the rear, while the main stairs and passenger elevators are in one of the corner towers on the front.

The second floor is used as the press room floor, and this floor is designed for a live load of 300 lbs. per square foot, and no troubles from vibration have been experienced.

The first floor has the heavy folding machines, but above the second floor the machinery loads are normal.

All of the window openings in the building are filled with solid steel sash, the ventilating sections, for the most part, being of the counterbalanced type.

Three freight elevators and two passenger elevators are provided for, serving all floors.

This building is fully equipped with sprinklers, with the sprinkler tank inclosed in the roof house at the rear of the building.

The entire building is heated with hot water.

DETAIL OF ENTRANCE

BUILDING OF WM. WRIGLEY, JR., CO., LTD., TORONTO, ONT.
MESSRS. PRACK & PERRINE, *ARCHITECTS AND ENGINEERS*

The Blackstone Cigar Building, Boston, Mass.

MESSRS. DENSMORE & LECLEAR,
Architects and Engineers

The Blackstone Cigar Building is of reinforced concrete throughout, of the beam and girder type, but is interesting from the standpoint that it was built on the so-called "Unit System," that is, all the columns, beams and girders were cast up on the ground and placed in the building similar to the method used in placing structural steel.

This is one of the very few buildings in this vicinity erected along these lines.

The roof over the sorting room in one wing of the building has a clear span of 48 ft. supported on reinforced concrete girders.

XUM

INDUSTRIAL INFORMATION

The Effects of Vibration in Structures

A pamphlet of unusual interest to architects engaged in the design of manufacturing buildings has been issued by the Aberthaw Construction Company of Boston, Mass., in the form of a preliminary report of the effects of vibration in structures.

The purpose of issuing this preliminary paper is stated to be, to encourage further co-operation, while experiments and study are continued.

For a final report is reserved a thorough analysis and weighing of evidence, together with the theoretical discussion, and the experimental records which are vitally essential to a comprehensive understanding of the subject.

Copies of this report will be sent upon request to those desiring it.

The American System of Heat Control

E. F. Houghton & Company, Third, American and Somerset Streets, Philadelphia, Pa., have issued Catalog K, illustrating and describing in detail the American System of Heat Control and the Thermostat which, it is claimed, accomplishes the results promised.

It appears that E. F. Houghton & Company was established in 1865, and has been in continual existence since that time. The business has passed through various stages of development from one of manufacturing petroleum lubricants exclusively to one producing various products and appliances designed to increase efficiency and reduce waste in the operation of manufacturing and power plants. The first step was taken in the marketing of heating appliances in 1895, when the company placed upon the market the Marck Steam Trap. From that beginning has grown the present heating and engineering department, which handles the manufacture and sale of both float and thermostatic steam traps, the Houghton Therm System of Steam Circulation, the American System of Heat Control, and sundry other apparatuses pertaining to these systems.

The need for heat control in practically every building where there is need for heat is now admitted, and an automatic system seems to be a logical meeting of these requirements in the present day and age. It is claimed that the American system provides this result in the highest degree. The catalog tells in detail how it is done. Copy will be sent to architects or engineers upon request.

Porcelain Enamel Iron Sanitary Ware

Humphryes Manufacturing Company, Mansfield, O., with branch offices in New York, Chicago and San Francisco, has issued catalog E, which describes and illustrates the line of Porcelain Enamel Iron Sanitary ware and brass goods used in the sanitary equipment of buildings.

The line comprises bath tubs, lavatories, manicure stands, drinking fountains, sinks, laundry trays, water closet tanks and combinations, urinals and tanks, and miscellaneous products.

In connection with these fixtures are brass goods necessary for their complete installation. The designs shown are attractive in appearance, and much data concerning dimensions, together with list prices, is given, making it possible to determine space required for various installations. Copy of this catalog will be sent to architects upon request.

DOORWAY—HOUSE OF W. L. GARRISON, JR., ESQ., WEST NEWTON, MASS.

MR. R. CLIPSTON STURGIS, *ARCHITECT*

MR. WM. B. COFFIN, *ASSOCIATE*